form, it is hoped, a not uninteresting page in her note-book.

The authorities for most of the statements in this paper are, besides Mr. Mallet's very valuable work before referred to, two exceedingly interesting papers in the Proceedings of the Royal Artillery Institution, by Captain F. S. Stoney, R.A., Assist. Supt. Royal Gun Factories, entitled "A Brief Historical Sketch of our Rifled Ordnance," and "The Theory of Gun Architecture."

NOTES

We learn by telegraph that the Sicilian section of the Eclipse Expedition, under Mr. Lockyer's directions, arrived safely at Rome on the morning of the 12th; thanks to the capital arrangements made by Mr. Vignoles with foreign railways for the transit of the party. Through carriages for the observers and instruments were taken from Ostend over the Brenner Pass to Verona; and they would have been sent further had not a breakage occurred in passing over the Brenner. The party intended leaving Naples for Syracuse in H.M.S. *Psyche* in the course of yesterday. All the Governments are aiding to the utmost in their power.

We are glad to be able again to report favourably of the state of both Sir R. Murchison and Prof. B. Stewart. The former has continued to gain somewhat in strength, and the progress of the latter from day to day has been as satisfactory as could be desired.

We have to announce that Mr. C. L. Bloxam has succeeded the late Dr. W. A. Miller as Professor of Chemistry in King's College, London, and that Dr. Debus, F.R.S., has been appointed Examiner in Chemistry to the University of London, in the place of the late Dr. Matthiessen.

President Woolsey of Yale College, U.S.A., has announced his intention of resigning his office. He has been President of Yale for more than a quarter of a century.

L'Abbe Moigno has discontinued the publication of his *Les Mondes* owing to the scarcity of paper and the impossibility of sending his periodical to the subscribers. L'Abbé Moigno, however, attends regularly the sittings of the Institute. M. de Parville is now the scientific editor of the *Journal Officiel*, as in former times. He is the only contributor to that paper who has been kept in office, which is highly creditable both to M. de Parville and to the French Government. M. de Parville's contributions are pirated by almost every French paper published in Paris, the only exception being the *Liberté* when M. de Fonvielle was in Paris. Now, *Liberté* must do like others. Reports on scientific matters are published in the *Journal Officiel* with more regularity and space devoted to them than in former times.

M. Decaisne, Professor of Agriculture at the Museum, has laid before the French Institute, of which he is a member, a scheme for the early growing of cabbages, radishes, &c., &c., which are to be sown in land richly manured, kept for a fortnight, and used stem and root, as a new description of vegetable. This diet is intended to protect Parisians against scurvy when the use of salt beef becomes still more frequent than it is now. The working of this scheme is superintended by M. Toigneaux, the editor of several agricultural papers. Different pieces of waste land close to the walls were appropriated, and vegetables of that description must be now actually on sale.

As soon as the investment of Paris was completed, the authorities took measures for preventing the destructive effects of shelling. Bills were printed and affixed to almost every house with directions for stopping the fire set up by the bursting of shells. Large tubs, filled with water, were placed on every floor of the large houses and private buildings. Although covered carefully with canvas, the water, having been left for weeks and weeks, became corrupted and fœtid. Proper instructions were given for stopping the infection by the using of charcoal. Two of these tubs are placed in the hall where the French Academy held its sittings, and two others in the *Salle des pas perdus*, by which visitors and members are introduced to it.

M. Barral, well known for the part he took in balloon experiments twenty years ago, has volunteered with his son for the balloon service. M. Barral was for many years the editor of the *Presse Scientifique*, a periodical which was discontinued a few years ago.

The *Société Chimique* continues its sittings, devoted exclusively to warlike, culinary, and sanitary purposes. This body has offered a gun to the Provisional Government. It was built on new principles, and paid for out of the funds of the society, which do not flow out of the national exchequer, the *Société Chimique* being one of the very few French scientific bodies which are not supported by the State.

M. Dumas is always in earnest for any improvement of diet. He has patronised the use of gelatine obtained from the carcasses of oxen, sheep, and pigs, by hydrochloric acid. The French Institute appears to have reversed the verdict given thirty years ago against the gelatine as proposed by D'Arcet, the only difference being that gelatine is not now prepared by steam, but by the action of acid on animal products, and that a new name, *osseine*, is given to the substance. He has also supported a scheme for grinding the whole of the corn, except the exterior coating, and the making of the flour so obtained into bread. But there is so large a quantity of corn and flour at Paris that the Government, although approving the scientific principles of this new method of grinding corn, declared the suggestion to be useless for the moment.

The same answer was given to another suggestion, relating to the roasting of the corn for making a kind of gruel called *bouillie romaine*. It appears that this was the diet of the Roman legions, and that the gruel so obtained is very acceptable indeed. A kitchen for public distribution was said to be opened, but Government interfered, thinking, very properly, that it would be good to delay such steps for many weeks. They will use it only if the siege is prolonged so long that there is some danger of actual starvation.

M. Berthelot, although not a member of the French Institute, is the president of a standing committee for using scientific discoveries in the defence of Paris. That committee holds its sittings at the Ministry for Public Instruction, of which M. Jules Simon is the head. Many valuable suggestions have been adopted by that committee, which was closely connected with the Committee of Barricades, presided over by Rochefort.

M. Jamin, the celebrated Professor of Natural Philosophy at the Sorbonne and member of the French Institute, has enlisted as a private in the artillery of the National Guard, and is doing his duty regularly, although begging for a weekly authorisation from the lieutenant in command to enable him to attend the sittings.

The two Becquerels, father and son, have left Paris, and their place is filled by supernumeraries. Some papers have remarked very sharply upon it, and asked for the discharge of the younger.

The following notification has been issued from the Home Department respecting the International Exhibition of 1871, dated Simla, October 11, 1870:—His Excellency the Viceroy and Governor-General in Council has been pleased to nominate the following gentlemen to form a Central Committee to assist the efforts of private individuals and others who may be willing to forward the objects of the Annual International Exhibition of Select Works of Fine and Industrial Art and Scientific Inventions, to be held at South Kensington on the 1st of May, 1871 : President, the Hon. Sir Richard Temple, C.S., K.C.S.I.; Members, his Highness the Maharajah of Jeypore, G.C.S.I., the Hon. B. H. Ellis, C.S.; Major-General the Hon H. W. Norman, C.B.; the Hon. J. Bullen Smith ; the Maharajah of Vizianagram, K.C.S.I.; Mr. W. G. Romaine, C.B.; Mr. E. C. Bayley, C.S., C.S.I.; Colonel the Hon. F. Thesiger, C.B.; Mr. Allan Hume, C.S., C.B.; Mr. H. Rivett-Carnac, C.S.; Lieut.-Colonel Baigrie, B.S.C.; Major O. T. Burne, Private Secretary to his Excellency the Viceroy. Honorary Secretary, Mr. H. Rivett-Carnac, C.S.

AT the meeting of the Royal Geographical Society, held on Nov. 29, a paper was read "On the Geography of the Sea Bed," by Capt. Sherard Osborn, R.N. The author gave an account of our present knowledge of the configuration of the bed of the ocean, as derived from Admiralty surveys and submarine telegraph expeditions during the last fifteen years. His explanations were illustrated by a number of diagrams showing sections of the North Atlantic and other oceans. It has been definitely ascertained that the greatest depth of the ocean does not reach 3,000 fathoms in any part where telegraphic lines have been laid. The bed of the North Atlantic consists of two valleys, the eastern extending from 10° to 30°, the Western from 30° to 50° West longitude. The extreme depth of the eastern valley is under 13,000 feet, which is less than the altitude of Monte Rosa. This valley has been traced southward to the equator. It is separated from the western valley by a ridge in 30° West long., in which the average depth is only 1,600 fathoms. This ridge terminates to the north in Iceland, and southward at the Azores, so that it is volcanic in its character at both extremities. Its extreme breadth appears to be under 500 miles, and the Atlantic deepens from it on both sides. Explorations carried on in the Mediterranean, the Red Sea, and the Indian Ocean, showed similar uniformity in the level of the sea-bottom ; and the general conclusions arrived at by Capt. Osborn were that in the deep sea there is an absence of bare rock, and that there are no rough ridges, canons, or abrupt chasms. Moreover, that the bed of the deep sea is not affected by currents or streams, even by those of such magnitude as the Gulf Stream ; but that it rather resembles the prairies or pampas of the American continent, and is everywhere covered with a sort of ooze or mud, the *débris* of the lower forms of organic life. In the course of the discussion, Professor Huxley said that, viewed on a great scale, there would be but slight difference between the large general features of the ocean bed and the dry land ; but that the smaller features would be different, as the effects of denudation would not appear in the deep ocean bed. To the naturalist, the observations of the telegraphists were of great importance, as showing the existence of low forms of animal life in the deepest seas ; and recent discoveries had shown that the most characteristic organisms of the deep-sea beds, named coccoliths and coccospheres, existed at all depths, even in shallow shore waters, and were also found fossil in sedimentary rocks of all epochs—a discovery of great interest, as confirming the view of the uniform conditions of submarine deposits in all ages of the earth's history. He was opposed to the view that the animals found living in the dark regions of the lowest sea depths depended for light upon the phosphorescence of some of the species, and saw no reason for concluding that they could not, like fungi, exist without light. He also doubted the accuracy of the very low temperatures said to have been found at great depths, and thought that those taken in the Indian Ocean might be explained by the fact that they were taken with thermometers not rectified for pressure.

AT a meeting of the Scientific Committee of the Horticultural Society, held on the 7th inst., a remarkable paper was read by Mr. Andrew Murray, on the subject of Mimetism, especially as exhibited in the instances of the South American butterflies, which have already been discussed in our columns. Mr. Murray adduced a number of arguments which he considered told against the theory that the Mimicry had been produced by Natural Selection, and attributed it to Hybridisation. We hope to be able to publish the paper in a future number.

A CONFERENCE of gentlemen interested in Scientific Education was held in the Royal Institution, Liverpool, on Tuesday night, the 6th inst., and unanimously passed a resolution declaring the advisability of establishing a Science College in that town, the cost of which was estimated at about 50,000*l.*, and a committee was appointed to take steps with the view of carrying out the object. Possibly the recent meeting of the British Association in Liverpool may have given an impetus to so laudable a design, which we hope may be successfully carried out.

A NEW quarterly journal is about to be published by Messrs. Groombridge and Sons, under the title of *The Landowner and Farmer's Note Book.* It will aim at presenting a well-arranged series of notes and suggestions in connection with estate and farm management.

MESSRS. LONGMAN intend to issue early in 1871 a Supplement to "Watts's Dictionary of Chemistry," bringing the record of chemical discovery down to the end of the year 1869. It will form a volume of about 900 pages, and many of the former contributors have consented to furnish additions to their articles.

THE new general Government of Elsass proclaimed by the King of Prussia, embraces, in addition to the departments of the Rhine which constituted the former Alsace, the arrondissements of Saarbourg, Château Salins, Saarguemines, Metz, and Thionville, taken from the departments of Moselle and Meurthe, in Lorraine. With the addition of these districts, the boundary of the new province marks out very nearly the German-speaking part of France. The fortresses of Thionville and Metz in the north, the natural barrier of the Vosges Mountains, and again the fortress of Belfort, in the south, will then protect the frontier of Germany towards France. From an article in the December number of *Petermann's Mittheilungen*, we learn that the new government has an area of 5,825 English square miles. This space is represented in English soil very nearly by the counties of Hants, Surrey, Sussex, and Kent, and it cuts off a thirty-sixth part from the whole of France. The fertility and industries of Elsass, however, support a population of 1,638,500, or a twenty-third part of the inhabitants of France, and the density of its population is comparable to that of the plains of China. In the new government the purely German-speaking area measures 4,425 square miles ; the purely French parts, which lie chiefly round the fortresses in the north and south, are together 985 square miles in extent, and the territory of a mixed language, which lies in patches between, makes up an area of 415 square miles.

THE series of botanical diagrams by Professor Balfour, of which we noticed the first some time since, is now issued in a complete form by Messrs. W. and A. K. Johnston, and comprises four large sheets 4ft. 2in. by 3ft. 6in. on rollers and varnished. They supply a marked desideratum for botanical teachers and lecturers, supplementing, but not replacing, Prof. Henslow's diagrams published by authority of the Science and Art Department. In the latter we have delineations of a plant belonging to each of the most important natural orders, with details of their structure. In Prof. Balfour's diagrams, each separate organ is taken, and the different variations of its form and structure illustrated. The first sheet showed the organs of plants generally, the tissues, root, and stem; in the second we have leaves and their modifications; in the third, inflorescence and the whorls of the flower, while the fourth presents us with the pistil, ovule, and seed, and the organs of flowerless plants. Many of the drawings are, strictly speaking, diagrams, that is, artificial representations of typical structure. They are well and clearly drawn, and sufficiently coloured to add to their lifelikeness. With these sheets, and either Henslow's series, or better still, a few hand-made ones on a larger scale, and actually taken from life, the botanical lecturer would be well provided; and the comparatively low price at which they are published ought to insure for them a very large sale. The handbooks which accompany them are admirably drawn up.

FROM China samples of Poyang Lake coal have been forwarded to the Admiralty authorities in the hope that they may be found useful for the navy in that station.

THE Government of India has taken further measures for carrying on coal borings in Central India, but only in Berar, and not in the Nizam's dominions.

THE Indian Government have again deputed Mr. T. W. H. Hughes, of the Geological Survey Department, to prosecute the investigation of the Wurda River coal-beds in the Central Provinces, and to report on the line of railway best calculated to develop the collieries.

OUR Darjeeling hill district of India is likely at length to experience a development of its mineral produce, instead of being left to depend on tea culture. Limestone, copper, and iron have been discovered not only in the Darjeeling territory, but also in the lately annexed Dooars of Bhootan. The Nepaulese have applied to work the iron ore, and the Commissioner of Kooch Behar has been authorised to divide the tract into sections, and to let out the mineral privileges by the year to the highest bidder.

A VERY important discovery of silver is reported from Copiapo, in Chile, which has a large silver district. El Carmen Mine is now producing 16,000 marcs of silver per month; that is 128,000 ounces, worth about 32,000*l.*

MR. JAMES GALBRAITH sends to the *Ararat and Pleasant Creek Advertiser* (Victoria), of Sept. 16th, an account of some huge boulders found near the townships of Hamilton and Coleraine, which he believes to have been deposited there by the agency of ice. He states that the whole of the western district of Victoria is covered with boulder clay. The ironstone gravel called buck-shot, which is found in patches on the surface and at a short distance below the surface, all over the plains to the south of Ararat and Beaufort, is, no doubt, a deposit from floating ice. The "grey stone" on the Ararat and Port Fairy road has been floated to its present position by ice; and a number of granite boulders on the road between Moyston and Ararat, some of them a great deal larger than the "grey stone," must have been brought to their present position by the same agency. No polished or striated rocks have, however, as yet been detected in the colony.

WE learn from the *New York Times* that an ice machine, constructed on Tellier's principle, is now being exhibited in the United States. The material used is gaseous ammonia, which is liquefied by pressure. It is said that the machine will make 100 tons a day, at a cost of four or five shillings per ton; and that the ice made by it is transparent and durable. The cooling effect of the vaporisation of liquefied ammonia may be applied to chambers containing articles of food to be preserved, or refrigerators might be constructed on any scale. The holds of ships could thus be converted into refrigerating chambers with the greatest ease, offering a ready means for the conveyance of meat from one port to another in a wholesome state.

BALLOON ASCENTS FOR MILITARY PURPOSES

II.

BEING detained in England by unavoidable circumstances for some time longer than I expected, I will try to give the British public an adequate view of the action of our French Institute in the matter of balloon navigation; and will confine my criticism to an exposition of M. Dupuy de Lome's own views, which were supported by the Government, so far as to give to this learned man a credit of nearly 2,000*l.* for the construction of his balloon. Perhaps the observations I have published in the *Liberté* and offered to some of his assistants in private conferences, have produced some alteration in the original scheme. It is a matter of which I cannot be made aware by any means, and I must suppose things to be as they were when I left Paris in my own balloon.

M. Dupuy de Lome's balloon was to be constructed out of silk, and I understood that people were engaged in looking after the stuff in different Parisian fancy shops. But it requires a great deal of search to find silk enough to construct a large balloon somewhat larger than Mr. Coxwell's "Research" and having a larger surface besides in consequence of its intended elongated form, the spherical form being, as is known, the one which offers the largest capacity for the smallest surface.

It may be well to remark that balloons are somewhat elongated in the present fashion of building them, the elongation being vertical instead of horizontal as required by M. Dupuy de Lome's scheme. But the elongation of the balloon is a thing of which we will speak more fully in another place.

M. Dupuy de Lome was not afraid to have his balloon shaped like an egg, or, rather, like a fish with two tails and no head, but he did not wish to try it with pure hydrogen gas. It is not because he thinks that hydrogen gas is too expensive or too difficult to prepare, it is only because he supposes that hydrogen gas would escape in spite of varnishing. I cannot agree with him in this respect, not only because my friend Giffard's balloons have proved perfectly hydrogen-tight, but principally because ordinary balloons filled with hydrogen have done good service. Amongst these balloons I may mention the one which conducted the unfortunate Worth to be lodged in a Cologne cell, not by any fault of its gas-holding power, but merely because aëronauts were foolish enough to open their valve when Prussians were firing at them, and preferred trusting to Prussian humanity to relying upon the dark mantle of the night.

Official people engaged in ballooning seem to have strong prejudices against hydrogen gas, as may be noticed from their acts; the battery I had caused to be constructed for filling poor "Liberté," having been wholly disregarded by them as unfit for use.

Many inventors have published descriptions of working aërostats, but very few of them were really professional aëronauts. I shall be justified by facts in stating that scarcely any of them was in a position to form an adequate idea of the most essential features of any really scientific scheme. Almost everyone of them has forgotten that the principal condition of success is an easy working. M. Dupuy de Lome has not avoided that fault, and his balloon is to be shaped, as we have remarked, like a fish, which is to be kept in an horizontal position. That condition is very difficult to accomplish when you have to look to so many other things at the same time. M. Dupuy de Lome is so well aware of the difficulty of having his balloon always progressing horizontally, that he proposes to get rid of it by keeping the balloon always filled either with gas, or with ordinary air by means of a pump. It is an instance of avoiding our old French saying, *Le remède est pire que le mal.* This saying is so much the more justified, that M. Dupuy de Lome is not contented with sending air into his balloon when it is required to fill it. He has constructed ready for the purpose a special balloon, which is to be enclosed within the large one, and which being alternately filled and unfilled according to the requirements of the external pressure, keeps the balloon always in a state of full expansion. The pressure inwards is always a little greater than the pressure outwards, which is in itself a new objection, as this artificial pressure increases the rate of escape for the gas by the small holes which are unavoidably so numerous in the whole surface. Besides, if there are some defective places, they may probably be opened by that pressure.

As you may understand from this explanation, M. Dupuy de Lome was very careful, and his scheme is worked out with every required detail, to show the corollaries which follow from the first assumptions. M. Dupuy de Lome being a very clever ship con-